

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: Leptoxis foremani

COMMON NAME: Interrupted rocksnail

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP: ☐

New LP: ____

Date when the species first became a Candidate (as currently defined): October 25, 1999

____ Candidate removal: Former LP: ____

____ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

____ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

____ F – Range is no longer a U.S. territory.

____ I – Insufficient information exists on biological vulnerability and threats to support listing.

____ M – Taxon mistakenly included in past notice of review.

____ N – Taxon does not meet the Act's definition of "species."

____ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails - Pleuroceridae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama, Georgia

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Elmore County, Alabama; Floyd County, Georgia

LAND OWNERSHIP

Rivers where this species occurs are under State jurisdiction. Riparian lands are in private ownership.

LEAD REGION CONTACT: Rick Gooch 404/679-7124, richard_gooch@fws.gov

LEAD FIELD OFFICE CONTACT: Jackson, Mississippi Field Office, Paul Hartfield, 601/321-1125, paul_hartfield@fws.gov

BIOLOGICAL INFORMATION

Species Description

The interrupted rocksnail is a small to medium sized freshwater snail that historically occurred in the Coosa River drainage of Alabama and Georgia. The shell is plicate with obscure striations, subglobose, thick, dark, brown to olive in color, and may be spotted. The spire of the shell is very low, and the aperture is large and subrotund.

Taxonomy

The interrupted rocksnail is a freshwater prosobranch gastropod in the family Pleuroceridae. The species was described from the Coosa River, Alabama, by Lea in 1842. The interrupted

rocksnail is a member of the Leptoxis plicata (Conrad 1834) group, which also included the Georgia rocksnail (Leptoxis downei (Lea 1868)) (Goodrich 1922). The interrupted rocksnail was believed to inhabit the lower Coosa River, with the Georgia rocksnail replacing it in the upper Coosa drainage. When the snail was rediscovered surviving in the Oostanaula River, Georgia, in 1997, it was recognized as L. downei (Williams and Hughes 1998, Johnson and Evans 2000). However, Burch (1989) had placed L. downei within L. foremani as an ecological variation, and L. downei is currently considered an upstream phenotype of the interrupted rocksnail, Leptoxis foremani (Johnson 2004). The American Fisheries Society and American Malacological Union recognize Leptoxis foremani as the valid species name (Turgeon et al. 1998).

Habitat

Rocksnails live in shoals, riffles, and reefs of small to large rivers. Their habitats are generally subject to moderate currents during low flows and strong currents during high flows. These snails live attached to bedrock, boulders, cobble, and gravel, and tend to move little, except in response to changes in water level. They lay their adhesive eggs within the same habitat (Johnson 2004). Interrupted rocksnails are currently found in shoal habitats with sand-boulder substrate, at depths less than 50 cm (20 in), and in currents less than 40 cm/sec (16 in/sec) (Johnson 2004).

Historical Range/Distribution

The interrupted rocksnail was historically found in the Coosa River and several of its tributaries in Alabama and Georgia, including the Coosa River in Coosa, Calhoun, Cherokee, Elmore, Etowah, Shelby, St. Clair, and Talladega Counties, and in Terrapin Creek in Cherokee County, Alabama; the Coosa and lower Etowah Rivers in Floyd County, Georgia, the Oostanaula River in Floyd and Gordon Counties, and the Conasauga River in Gordon, Whitfield, and Murray counties, Georgia (Goodrich 1922; Johnson 2004). The snail was found in colonies on reefs and shoals.

Current Range/Distribution

Numerous snail surveys have been recently conducted within the historical range of the interrupted rocksnail (Davis 1974; M. Pierson, Field Records 1991-1998, Calera, Alabama, in litt.; Bogan and Pierson 1993; Williams and Hughes 1998; Jim Godwin, Alabama Natural Heritage Program, in litt. 1998). These survey efforts resulted in the collection of only a single live specimen from the Oostanaula River, Floyd County, Georgia, during 1997 (Williams and Hughes 1998). Intensive surveys of the Oostanaula, Coosa, and Conasauga Rivers since 1999 have located the species in about 7.4 miles of the Oostanaula River upstream of the Gordon/Floyd County line (Johnson and Evans 2000; Johnson and Evans 2001; Johnson 2004). A captive colony has been maintained at the Tennessee Aquarium Research Institute (TNARI) since 2000 for study and propagation. In coordination with TNARI and the Service, the Alabama Department of Conservation and Natural Resources (ADCNR) developed a plan and strategy to reintroduce interrupted rocksnails from the TNARI colony into the Coosa River above Wetumpka, Elmore County, Alabama (ADCNR 2003). In 2003, 2004, and 2005 approximately 3200, 1200, and 3000 juvenile snails, respectively, from the TNARI culture were

released into the lower Coosa River (ADCNR 2004).

Population Estimates/Status

Since monitoring began, the interrupted rocksnail population size in the Oostanaula River has declined precipitously from a high of 10-45 snails/square meter in 1999 (Johnson and Evans, 2000) to only 20 snails found during a 6 man/hour search in 2004 (P. Johnson, in litt. 2004). Since their reintroduction into the lower Coosa River of Alabama, a small number of the 2003 hatchery-cultured interrupted rocksnails have been observed in the vicinity of the release site (P. Johnson, ADCNR pers. comm.. 2005).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The interrupted rocksnail has disappeared from virtually its entire historical range. This significant curtailment of range is primarily attributed to the construction of dams, changes in flows, and increases in water-borne pollution, particularly sediments.

About 50 percent (161 kilometers (100 miles)) of the interrupted rocksnail's historical habitat is affected by dams. Rivers impounded by dams have reduced water velocities, allowing sediments to accumulate on river channel habitats behind dams. Impounded waters also experience changes in water chemistry, which can affect survival or reproduction of riverine snails. For example, reservoirs in the Coosa River drainage experience some level of eutrophic (i.e., enrichment of a water body with nutrients) conditions (Alabama Department of Environmental Management (ADEM) 1994, 1996). The interrupted rocksnail requires highly oxygenated moving waters and clean rock bottoms to survive and reproduce. The physical and chemical changes to water and habitat resulting from impoundments affect feeding, respiration, and reproduction of the interrupted rocksnail. The Oostanaula River is currently affected by hydropower releases from Carters Dam. Cold water temperatures, and peaking flows are believed to be limiting factors to mollusks in the Oostanaula. A Federal Energy Regulatory Commission (FERC) license has been issued to construct a powerhouse facility on the Carters Reregulation Dam.

Prior to the passage of the Clean Water Act and the adoption of State water quality criteria, water pollution may have been a significant factor in the disappearance of interrupted rocksnail populations from unimpounded portions of river channels. For example, Hurd (1974) noted the extirpation of freshwater mussel communities from the Conasauga River below Dalton, Georgia, apparently as a result of textile and carpet mill waste discharges. He also attributed the disappearance of the mussel fauna from the Etowah River and other tributaries of the Coosa River, to organic pollution and siltation. Although many water quality problems have been eliminated or improved by State and Federal water quality laws and regulations, the suspected cause of the recent decline in interrupted rocksnail numbers in the Oostanaula River is pollution or degraded water chemistry (P. Johnson, in litt., 2004).

Short-term and long-term impacts of point and non-point source water and habitat degradation

continue to be a primary concern for the survival of the interrupted rocksnail. Point source discharges and land surface runoff (non-point pollution) can cause eutrophication, decreased dissolved oxygen concentration, increased acidity and conductivity, and other changes in water chemistry that are likely to seriously impact aquatic snails. Point sources of water quality degradation include municipal and industrial effluents.

Non-point source pollution from land surface runoff can originate from virtually any ground-disturbing land use activity and may include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, and oils and greases. During recent mollusk surveys of the upper Coosa River system, sediment deposition and other forms of pollution were identified as causes of habitat degradation (Williams and Hughes 1998). Excessive sediments impact riverine snails requiring clean, hard shoal stream and river bottoms, by making the habitat unsuitable for feeding and/or reproduction. Similar impacts resulting from sediments have been noted for many other components of aquatic communities. For example, sediments have been shown to abrade and/or suffocate periphyton (i.e., organisms attached to underwater surfaces, upon which snails may feed); affect respiration, growth, reproductive success, and behavior of aquatic insects and mussels; and affect fish growth, survival, and reproduction (Waters 1995). Field observations indicate that the interrupted rocksnail is limited by fine sediment deposition in the shoals where it survives (P. Johnson, TNARI, pers. comm. 2000). Portions of the Oostanaula River drainage are affected to varying degrees by sedimentation.

Land surface runoff also contributes the majority of human-induced nutrients to water bodies throughout the country. Excessive nutrient input from fertilizers, sewage waste, animal manure, etc. can result in periodic low dissolved oxygen levels that are detrimental to aquatic species (Hynes 1970). Nutrients also promote heavy algal growth that may cover and eliminate clean rock or gravel habitats of shoal dwelling snails. Nutrient and sediment pollution may have synergistic effects (a condition in which the toxic effect of two or more pollutants is much greater than the sum of the effects of the pollutants when operating individually) on freshwater snails and their habitats, as has been suggested for aquatic insects (Waters 1995).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

The interrupted rocksnail has no commercial value, and overutilization has not been a problem. However, unregulated collecting by private and institutional collectors could pose a threat due to the species' rarity.

C. Disease or predation.

Disease is not currently considered to be a factor in the decline of the interrupted rocksnail. Aquatic snails are consumed by various vertebrate predators, including fishes, mammals, and possibly birds. Predation by naturally occurring predators is a normal aspect of the population dynamics of a species and is not considered a threat to this species. The black carp (*Mylopharyngodon piceus*), a mollusk-eating Asian fish used to control snails in commercial fish farms, has been found in the upper and lower Mississippi River (Schofield et al. 2005). Although not yet recorded from the Mobile River Basin, the black carp would likely have a considerable impact on the interrupted rocksnail should it become established in the Coosa River

drainage.

D. The inadequacy of existing regulatory mechanisms.

There is currently no information on the sensitivity of the interrupted rocksnail to common industrial and municipal pollutants. Current State and Federal regulations regarding such discharges are assumed to be protective; however, this snail species may be more susceptible to some pollutants than test organisms currently used in bioassays. A lack of adequate research and data may prevent existing authorities, such as the Clean Water Act, administered by the Environmental Protection Agency and the Army Corps of Engineers, from being fully utilized. Lacking State or Federal recognition, the interrupted rocksnail is not currently given any special consideration under other environmental laws when project impacts are reviewed.

E. Other natural or manmade factors affecting its continued existence.

The interrupted rocksnail is known from a restricted reach of the Oostanaula River, and it has been reintroduced to one shoal in the lower Coosa River. Limited distribution, and small population size makes this species highly vulnerable to random natural or manmade catastrophic events such as droughts or chemical spills. Inbreeding and reduced genetic diversity may also be a threat (Avisé and Hambrick 1996).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service has been working with TNARI to locate extant populations, establish a captive breeding colony, and develop information on life history and habitat. The Alabama Department of Conservation and Natural Resources (ADCNR) has experimentally reintroduced the species into the lower Coosa River in Alabama, and plans annual augmentations for the next four years (ADCNR 2003). The Alabama Power Company has indicated an interest in developing a candidate conservation agreement for the species in the lower Coosa River.

SUMMARY OF THREATS

The interrupted rocksnail has been reduced to a single natural population. Numbers of snails within that population have declined over the past years. The habitat is currently affected by hydropower releases and nonpoint source pollution.

RECOMMENDED CONSERVATION MEASURES

Maintain a captive colony; establish additional populations; conduct research on life history and habitat.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

Only a single localized natural population is known to survive. That population is affected by point and nonpoint source pollution, and is subject to a fluctuating hydrograph due to hydropower production. Small population size magnifies the threats.

Imminence:

The interrupted rocksnail population size has declined precipitously in the Oostanaula River during the past three years. Threats from pollution are imminent since they are ongoing. Fate of the snails released into the Coosa River is unknown.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No, at this time, we do not believe that the current immediacy or magnitude of identified threats to the species warrant the need for emergency listing as outlined in section 4 of the Endangered Species Act. The Service will continue to monitor and assess the status and trends of the species and may adjust this conclusion using the best scientific and commercial information as it becomes available.

DESCRIPTION OF MONITORING: Since the last update of this assessment form, species

experts and appropriate individuals with State and Federal agencies have been contacted and asked to provide any new data on the interrupted rocksnail. These include Dr. Paul Johnson, formerly affiliated with TNARI, now ADCNR; Stan Cook, ADCNR; David Forster, Georgia Department of Natural Resources (GDNR); Sandy Tucker, USFWS; Robin Goodloe, USFWS. TNARI has conducted annual monitoring of the Oostanaula River population from 1999 through 2005. ADCNR monitors the reintroduced snails in the lower Coosa River (P. Johnson, pers. comm. 2005).

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: The GDNR and ADCNR were provided with a copy of this species assessment for their review.

Indicate which State(s) did not provide any information or comments: Neither GDNR nor ADCNR had any additional information or comments.

LITERATURE CITED

Peer-reviewed original research based on data:

Goodrich, C. 1922. The Anculosae of the Alabama River Drainage. Miscellaneous Publications, Museum of Zoology, University of Michigan (7):1-57.

Peer reviewed secondary research derived:

Awise, J.C. and J.L. Hambrick, eds. 1996. Conservation genetics: case histories from nature. Chapman and Hall, New York.

Burch, J.B. 1989. North American freshwater snails. Malacological Publications. Hamburg, Michigan. Pp. 154-155.

Hynes, H.B.N. 1970. The Ecology of Running Waters. University of Toronto Press, Toronto.

Johnson, P.D. 2004. Interrupted rocksnail Leptoxis foremani. Pp.116 in R.E. Mirarchi, J.T. Garner, M.F. Mettee, P.E. O'Neil, eds. Alabama wildlife. Volume 2. Imperiled aquatic mollusks and fishes. The University of Alabama Press, Tuscaloosa, AL.

Turgeon, D. D., J. F. Quinn, Jr., A. E. Bogan, E. V. Coan, F. G. Hochberg, W. G. Lyons, P. M. Mikkelsen, R. J. Neves, C. F. E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F. G. Thompson, M. Vecchione, and J. D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: mollusks, 2nd edition. American Fisheries Society Special Publication 26, Bethesda, Maryland.

Schofield, P.J., J.D. Williams, L.G. Nico, P. Fuller, and M.R. Thomas. 2005. Foreign nonindigenous carps and minnows (Cyprinidae) in the United States – A guide to their identification, distribution, and biology. U.S. Geological Survey Scientific Investigations Report 2005-5041, 103 p.

Waters, T.F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7. 251 pp.

Grey research based on data:

Alabama Department of Environmental Management (ADEM). 1996. Water quality report to Congress for calendar years 1994 and 1995. Montgomery, Alabama. 144 pp.

Alabama Department of Environmental Management. 1994. Water quality report to Congress for calendar years 1992 and 1993. Montgomery, Alabama. 111 pp.

Bogan, A.E. and J.M. Pierson. 1993. Survey of the aquatic gastropods of the Coosa River Basin, Alabama: 1992. Alabama Natural Heritage Program. Contract Number 1923.

Davis, G.M. 1974. Report on the rare and endangered status of a selected number of freshwater Gastropoda from southeastern U.S.A. Report to the U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C. 51 pp. 25 maps.

Hurd, J.C. 1974. Systematics and zoogeography of the unionacean mollusks of the Coosa River drainage of Alabama, Georgia, and Tennessee. Ph.D. Dissertation, Auburn University, Auburn, AL. 240 pp.

Johnson, P. D. and R.R. Evans. 2000. A contemporary and historical database of freshwater mollusks in the Conasauga River Basin. Report to USGS. SARI, Cohutta, GA.

Johnson, P. D. and R.R. Evans. 2001. The status of Leptoxis downiei in the upper Coosa River system of Georgia and Alabama. Report to USFWS. SARI, Cohutta, GA.

Williams, J.D. and M.H. Hughes. 1998. Freshwater mussels of selected reaches of the main channel rivers in the Coosa drainage of Georgia. U.S. Geological Survey report to U.S. Army Corps of Engineers, Mobile District. 21 pp. and appendices.

Grey literature based on literature analysis:

Other:

Alabama Department of Conservation and Natural Resources (ADCNR). 2003. Plan for the reintroduction of Leptoxis foremani (Interrupted Rocksnail) to Coosa River, Wetumpka, Alabama. Department of Wildlife and Fisheries, Fisheries Section, Montgomery, Alabama. 4pp.

Alabama Department of Conservation and Natural Resources. 2004. Interrupted rocksnail reintroduced to the Coosa River. Outdoor Alabama 76(1):33.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date



Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Jackson, Mississippi Field Office